LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Aug. 22-26, 2011.

E. coli

The *E. coli* outbreak earlier this year that sickened at least 3,900 people and killed 52 in Europe and North America was a rare strain. So rare that it proved resistant to antibiotics. For decades, the primary weapon against such an outbreak is penicillin, which is naturally produced by a mold that kills bacteria.

But the targeted bacteria have evolved to defend themselves against naturally occurring antibiotics and Livermore researchers are crafting a new, lethal synthetic remedy to fight drug-resistant bacteria.

LLNL researcher Paul Jackson is turning *E. coli*'s internal processes against it. He found that a purified form of lytic protein, used by the bacteria to prick small holes in their own cell walls before multiplying, could become a weapon.

To read more, go to the Web.

New analysis of an important moon rock brought back by the Apollo 16 mission in 1972 is showing that the moon may be at least 200 million years younger than once thought.

"It's not as ancient as we might think," said study chief author Lars Borg, an LLNL geochemist whose article appeared in the journal *Nature*.

The study uses new techniques and radioactive isotopes of lead and other elements to date the moon rock at approximately 4.4 billion years old. What's key is that this is a special type of rock that would have floated up to the moon's crust soon after its theorized ocean of molten rock cooled. That supposedly happened soon after the moon formed as a result of a spectacular crash between Earth and a planet. The chunks that broke off formed the moon.

That means there are two possibilities, Borg said. Either the moon is 200 million years younger or the accepted theory of a molten rock ocean on the moon is wrong, he said.

To read more, go to the Web

A strand of DNA

A little black box could save you the wait in a doctor’s office for lab results. It's the fastest DNA copy machine yet.

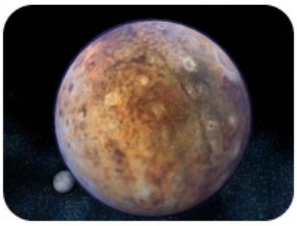
Reg Beer, an engineer at LLNL, knows about that wait. "I was in a waiting room with my child, when I really thought, 'What if we could do this a lot faster? "

In crime scene investigation and other police procedurals, DNA is used to identify criminals. But more often it is used to identify pathogens such as HIV, tuberculosis and SARS. But DNA tests still take too long, taking as much as several hours because the researcher has to make many copies of the DNA first.

Part of the Lab's secret is a new porous material that can heat a larger sample, and cool it again, at insane speeds. It can be powered by batteries, and made very small. The hope is that, soon, health labs will be able to use DNA to identify hundreds of pathogens -- in just minutes, using a device the size of a shoebox.

To see a video, go here.

Los Angeles Times | THE EVER-CHANGING WORLD OF SCIENCE



One of many changes of our understanding of the universe: Pluto is downgraded to "dwarf planet."

For centuries, scientists have been making paradigm-shifting discoveries that reordered our sense of the universe and our place in it.

Otherwise, humans would still think that the sun and the planets revolved around Earth, forcing scientists and philosophers to concoct increasingly elaborate explanations for observations of celestial movements that don't fit that worldview.

One recent Lab discovery is that the moon isn't quite as old as everyone thought. But even that isn't exact. The study goes on to say that the process by which the moon formed happened later than scientists thought or this lunar rock, part of the moon's crust, isn't exactly what scientists thought it was.

"And that's a big deal," said Lars Borg, the lead author of the study and a geochemist at Lawrence Livermore National Laboratory.

Although not a done deal. Scientists will keep studying and debating this. To read more, go to the Web.

Earth Techling

IT'S GASSY DOWN THERE

Automaker BMW is looking at trash as a new source of fuel.

The company has launched a pilot program to turn the methane gas emitted by landfills into hydrogen. Once the methane has been converted to hydrogen, BMW hopes to use the energy source to power hydrogen fuel-cell-driven equipment in its 1.2 million-square-foot Spartanburg, S.C., plant

Though the company won't divulge how they convert the methane to hydrogen, the automaker is involved in at least two projects with the U.S. Department of Energy (DOE) to develop storage of hydrogen to power its future motor vehicles.

One such project is with the Laboratory to produce and store cryo-compressed hydrogen to fuel autos.

To read more, go to the Web.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

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